

CLAIMS

1. Heat exchange unit for pseudo-isothermal reactors including a substantially cylindrical shell (2) closed at its opposite ends by respective bottoms (3, 4), at least one thereof is provided with at least one manhole opening (5) of predetermined dimensions, a reaction zone (6) inside the shell (2) in order to contain a catalytic bed, characterized in that it comprises at least two modular and assembled heat exchangers (11), having predetermined cross dimensions smaller than those of the manhole opening (5), each heat exchanger (11) comprising at least one heat exchange element (12).
2. Heat exchange unit according to claim 1, characterized in that said at least one heat exchange element (12) comprises a pair of juxtaposed metallic plates (13a, 13b), mutually adjoined in predetermined spaced relationship by means of welds (14, 16), so as to define between them a gap (15) of predetermined width.
3. Heat exchange unit according to claim 2, characterized in that said plates (13a, 13b) are mutually adjoined by a plurality of welding spots (16) defining within the gap (15) of respective heat exchange elements (12) a plurality of tortuous paths for an operating fluid, all in fluid communication with respective inlet and outlet junctions (17, 18) of said operating fluid, provided on opposed sides of said elements (12).
4. Heat exchange unit according to claim 3, characterized in that said welding spots (16) are distributed according to a quincunx and/or square pitch.
5. Heat exchange unit according to claim 3, characterized in that each exchanger (11) comprises a plurality of heat exchange elements (12), connected and stiffened in a single structure.

6. Heat exchange unit according to claim 5, characterized in that said junctions (17, 18) of said heat exchange elements (12), are connected and fastened to respective upper and lower ducts (19, 20).

5 7. Heat exchange unit according to claim 5, characterized in that the elements (12) are arranged within each exchanger (11) according to a radial pattern.

10 8. Heat exchange unit according to claim 6, characterized in that it comprises a plurality of manifolds (26, 39) in fluid communication with said lower ducts (20) and arranged so as to form a plane and grid-shaped structure, adapted to support said heat exchange unit (10), inside said shell (2).

15 9. Pseudo-isothermal reactor including a substantially cylindrical shell (2), closed at its opposed ends by respective bottoms (3, 4), at least one thereof is provided with at least one manhole opening (5) of predetermined dimensions, a reaction zone (6) within the shell (2) in order to contain a catalytic bed, characterized in that it  
20 comprises at least two modular and assembled heat exchangers (11), having predetermined cross dimensions smaller than those of said manhole opening (5), each heat exchanger (11) comprising at least one heat exchange element (12).

25 10. Reactor according to claim 9, characterized in that said at least one heat exchange element (12) comprises a pair of juxtaposed metallic plates (13a, 13b), mutually adjoined in a predetermined spaced relationship by welds (14, 16), so as to define between them a gap (15) of  
30 predetermined width.

11. Reactor according to claim 9, characterized in that it comprises a heat exchange unit (10) comprising said at least two exchangers (11), having a cylindrical

configuration provided with an outer diameter equal to the inner diameter of said shell (2) and axially crossed by an axial passage (30), which has a diameter adapted to form a manhole.

5 12. Reactor according to claim 11, characterized in that it comprises a central duct (27), arranged and extending into said axial passage (30) of said heat exchange unit (10).

10 13. Reactor according to claim 11, characterized in that said heat exchange unit (10) comprises at least two pluralities (9a, 9b, 9c) of heat exchangers (11), all having a cylindrical configuration, supported the one within the other, wherein the elements are arranged coaxial and concentric between them.

15 14. Reactor according to claim 10, characterized in that said plates (13a, 13b) are mutually adjoined by a plurality of welding spots (16) defining inside the gap (15) of respective heat exchange elements (12), a plurality of tortuous paths for an operating fluid, all in fluid communication with respective inlet and outlet junctions  
20 (17, 18) of said operating fluid, provided on opposed sides of said elements (12).

25 15. Reactor according to claim 14, characterized in that each exchanger (11) comprises a plurality of heat exchange elements (12), connected and stiffened in a single structure.

16. Reactor according to claim 15, characterized in that said junctions (17, 18) of said heat exchange elements (12) are connected and fastened to respective upper and lower ducts (19, 20).

30 17. Reactor according to claim 15, characterized in that the heat exchange elements (12) are arranged within each heat exchanger (11) according to a radial pattern

18. Reactor according to claim 16, characterized in that it comprises a plurality of manifolds (26, 39) in fluid communication with said lower ducts (20) and arranged so as to form a plane and grid-shaped structure, adapted to support said heat exchange unit (10) inside said shell (2).